Chapter 2

General Information

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Introduction

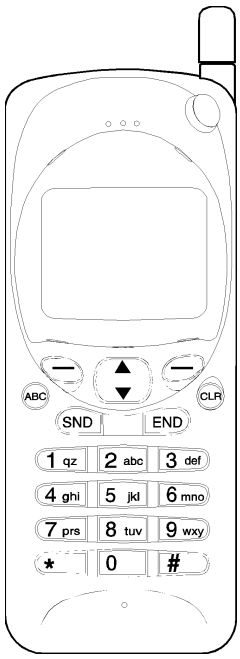
NHD–4 is a dual mode handportable Cellular phone product for the North American dual mode CDMA/AMPS system.

The transceiver consist of four modules: UI–flex, RF/system module, battery pack and mechanics.

NHD–4 offers analog and digital mode full rate speech services defined in IS–96 and in analog mode provides six power levels at a maximum power level of 0.6W ERP (450mW into 50 Ohm load) in power class III. The transceiver has a retractable antenna and a connector for external antenna and accessories. The user communicates with the phone via LCD–display, keyboard and some audible tones.

The transceiver will support an Analog PCMCIA Card.

NHD–4 can be connected to different accessories such as chargers, holders, hands–free units, data–adapters and handset through the bottom system connector.



NOKIA1

Figure 1. NHD–4

List of Modules

Nokia1 NHD–4NX

Table 1. Nokia1 NHD–4NX 0500322

Name of module	Type code	Material code	Notes
User interface	DU8D	0200521	Nokia 1
System/RF	GR1	0200519	CDMA 800 MHz Radio Module
Mechanics	MNHD4NX	0260523	Nokia 1

Units and Accessories

Table 2. List of Transceivers

Name of Tranceiver	Design Version	Type Code	Material Code
Transceiver CDMA 2180	Nokia 1	NHD–4NX	0500322

Table 3. List of Battery Packs

Design	Type		Technology	Type Code	Material Code
Nokia1, CDMA	Slim,	600 mAh	NiMH	BBH –1S	0670027
Nokia1, CDMA	Std,	1100 mAh	NiCd	BBH–2H	0670030
Nokia1, CDMA	Ext,	1700 mAh	NiMH	BBH –1H	0670028
Nokia1, CDMA	Vibrator,	600 mAh	NiMH	BBT–1XV	0670119

Table 4. List of Chargers (

Name	Type Code	Material Code	Notes
Fast Travel Charger	ACH–4U	0675012	USA model
Cigarette Lighter Charger	LCH–2	0675005	Universal
Desktop Charger	CHH–2	0675022	Universal
HF Desktop Charger	CHH–8	0675026	Universal
AC Adapter	ACS–6U	0680018	USA model, needed for CHH–8

Table 5. List of Mobile Installation Accessories

Name	Type Code	Material Code	Notes
Mobile Holder	MBH–6	0620009	
Mobile HF Charging Holder	MCH–8	0620010	
HF Junction Box	HFJ–3	0694009	
External HF Speaker	HFS–6	0692005	
HF Microphone	HFM–4	0690002	Original
HF Microphone	HFM–10	0690009	New , ”mouse” type
Power Cable	PCH–4	0730009	
External Audio Handset	HSU–1	0640047	
Compact HF	PHF–1	0700017	
Power Cable	LCP–2	0680022	
Mounting Plate	MKE–1	0650007	
Swivel Kit	HHS–1	0650006	3 screws
Swivel Kit	HHS–6	0650019	4 screws
Cable Holder	CKH–1	0620016	

Table 6. List of Data Accessories

Name	Type	Material code	Notes
PC–Link Adapter	DAU–2	0750029	
Data Cable	DKH–1	9780084	CHH–8 → PC Link
Data Cable	DKH–2	0730041	Adapter Cable
Data Cable	DKH–5	0730038	HP–PC Link

Table 7. List of General Accessories

Name	Type code	Material code	Notes
Carry Strap	SWH–1	0720005	
Belt Clip	BCH–2	0720022	
Headset	HFS–11	0690010	Over the head headset
Headset	HDC–2	0694017	Button headset

Basic Specifications

Table 8. Basic Specifications

Parameter	Notes
Cellular system	CDMA/AMPS
TX frequency band	824.010...848.970 MHz
RX frequency band	869.010...893.970 MHz
Duplex spacing	45 MHz
Number of RF channels	832 Analog (see IS–95 6.1.1.1 for CDMA)
Channel spacing	30 kHz Analog (see IS–95 2.1.1.1 for CDMA)
Power Class	III
Maximum output power	600 mW ERP (AMPS) 200 mW (CDMA)
Method of frequency synthesis	Digital phase–locked loops
Frequency control	VCTCXO
Receiver type	IF, linear in D–mode, nonlinear in A–mode
Modulator type	I/Q–baseband in D–mode, FM–modulator in A–mode
Operational Voltage	5.3V...8.8 V

Technical Specifications

Modes of Operation

NHD–4 operates in three modes:
1. In AMPS mode it operates in analog paging and voice channels.
2. In digital mode it operates on digital synch, paging pilot and traffic channel.
3. Test mode (Local mode) used for troubleshooting and diagnostic testing.

DC Characteristics

Table 9. Supply Voltages and Current Consumption

Line Symbol	Minimum	Typical / Nominal	Maxi-mum	Unit / Notes
VBAT	5.3	6.0	8.8	V
VCHAR	11.0	12.0	13.5	V / chargers
VCHAR	730	800	870	mA / chargers

AC Characteristics

Table 10. General RF Specifications

TX frequency band	824.04...848.970 MHz
RX frequency band	869.04...893.970 MHz
Duplex spacing	45 MHz
Number of RF channels	832 Analog
Channel spacing	30 kHz Analog

Analog Mode

Table 11. Transmitter Specifications for ANALOG mode

Modulation method	FM
Deviation, speech and ST	±12 kHz peak
Deviation, WBD	±8 kHz peak
Deviation, SAT	±2 kHz peak
Deviation, voice and SAT	±14 kHz peak
Compressor	2:1
Output RF power (ERP from int. ant.)	26.3...6.3 dBm
Output RF power (ERP from int. ant.)	26.8...6.8 dBm
Number of power levels (2–7)	6
Carrier on/off switching time	< 2ms
Frequency stability	±2.5 ppm
Harmonic and spurious emissions	43 +10*log (Po W) dB below carrier

Table 12 Receiver Specifications, for ANALOG mode

Sensitivity, 12 dB SINAD (C)	–116 dBm
Hum and noise	32 dB
RSSI dynamic range	60 dB
Adjacent channel selectivity	16 dB
Alternate channel selectivity	60 dB
IMD attenuation, close spaced	65 dB
IMD attenuation, wide spaced	70 dB

Digital Mode

Table 13. Transmitter Specifications for CDMA mode

Spurious emissions in transmit band	–42 dBc in a 30 KHz BW for offsets > 885 KHz from center F –54 dBc in a 30 KHz BW for offsets > 1.98 MHz from center F or –60 dBm/30 KHz and –54 dBm/1.23 MHz for offsets > 885 KHz from center Frequency
Spurious emissions out off transmit band	FCC rules
TX noise floor at minimum TX power	–54 dBm/1.23 MHz (TX gate on), –60 dBm/1.23 MHz (TX gate off)
TX noise floor with TX disabled	–61 dBm/MHz for all frequencies between 824 and 849 MHz
TX noise floor at RX band with Max. output power	–173 dBm/Hz (TBD) at RX input port
TX power control method	Output_power (dBm) = –73 dBm – Receive_power (dBm) + TX offset (dB). Open + closed loop AGC.
TX power initial accuracy	+/–9 dB within value as specified by TX control method
TX duty cycle	1/1, 1/2, 1/4, 1/8 variable rate with random slots. A slot is 1.25 ms. Rate is controlled by voice activity
TX offset control method	From base station with one increments or decrement every 1.25 ms (but only during active transmit slot)
TX offset control step size	1 dB +/–0.5, and +/–20% over 10 steps in same direction
TX offset range	+/–32 dB (+/–24 dB step range, +/–8 dB preset offset)
Modulator type	I/Q modulator, OQPSK format
Peak to rms after modulation	6 dB
I/Q Modulator phase error	+/–6 deg (+/– 4 deg for D/A and filter)
I/Q Modulator gain balance	+/–0.65 dB (+/–0.35dB for D/A and filter)
I/Q Modulator input level	1Vpp

Table 14 Receiver RF specification, CDMA mode

Characteristics	Min	Typ	Max	Unit
Single tone desensitization, +/–900KHz (Note 1)	–30			dBm
Intermodulation spurious response level	–30			dBm
Passband amplitude response 1 kHz 615 kHz 900 kHz >900 kHz	 –73 –73	 –5	 –3	 dB dB dB dB
Passband phase error (mean^2) response		0.03		rad ^{2}
Receiver gain	–12		91	dB
Receiver gain tolerance range (without gain setting)			14.8	dB

Table 14 Receiver RF specification, CDMA mode (continued)

Characteristics	Min	Typ	Max	Unit
AGC range	96			dB
AGC accuracy (output level variation for inputs –105 to –25 dBm)	–.5		+.5	dB
Baseband output level, centered on Vref 1.45V		1		Vpp
Baseband output level variation over RX input level of –105 to –25 dBm	–0.5		0.5	dB
I/Q Amplitude imbalance	–0.75		0.75	dB
I/Q Phase imbalance	–7.5		+7.5	deg

Mechanical Characteristics

Metric Units

Table 15. Mechanical Characteristics in Metric Units

Unit	Dimensions (mm) (W x H x D)	Weight (g)	Volume (cm^3)	Notes
Transceiver with standard battery pack	56x148x25	238	179	Nokia 1
Transceiver with standard battery pack	56x148x25	241	179	US CDMA
Transceiver without battery pack	56x148x25	134	137	Nokia 1
Transceiver without battery pack	56x148x25	137	137	US CDMA
Radio module	143x50x7	48		Common
UIF module	141x50x4	22		
Mechanics		62 ... 67		depends on design version
Battery pack 600 mAh	56x101x8	104	42	NiMH, standard battery
Battery pack 1100 mAh	56x101x20	162	90	NiCd
Battery pack 1700 mAh	56x101x20	188	90	NiMH
Battery pack vibra				NiMH

English Units

Table 16. Mechanical Characteristics in English Units

Unit	Dimensions (in.) (W x H x D)	Weight (oz.)	Volume (inches^3)	Notes
Transceiver with standard battery pack	2.2x5.8x0.98	8.39	10.9	Nokia 1
Transceiver with standard battery pack	2.2x5.8x0.98	8.50	10.9	US CDMA
Transceiver without battery pack	2.2x5.8x0.98		8.36	Nokia 1
Transceiver without battery pack	2.2x5.8x0.98	4.83	8.36	US CDMA
Radio module	5.6x2.0x0.28	1.69		Common
UIF module	5.6x2.0x0.16	0.76		
Mechanics		2.19 ... 2.36		depends on design version
Battery pack 600 mAh	2.2x4.0x0.31	3.67	2.56	NiMH, standard battery
Battery pack 1100 mAh	2.2x4.0x0.31	5.71	5.49	NiCd
Battery pack 1700 mAh	2.2x4.0x0.31	6.63	5.49	NiMH
Battery pack vibra				NiMH